Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (original): A new method of mapping the reservoir rocks, using seismic reflection recording and measuring the effects of the rock's elastic nonlinearity on the seismic reflected signals due to the rock's porosity, fracturing, heterogeneity and pore fluids and distinguishing these reservoir rocks from the rocks that are relatively linear due to lack of porosity, homogeneous rock structure and lower fluid content, such method comprising (a) through (j) below:

(a) recording seismic reflection data using an impulsive energy source and receivers in a conventional 2-D or 3-D configuration;

(b) using seismic detectors, digitizers and other ancillary equipment to record the seismic data with a broad frequency bandwidth, which covers lower frequencies down to Zero Frequency and higher frequencies up to twice the highest useable frequency generated by the seismic source;

(c) preserving the true relative amplitude of the new frequencies, which are created in the subsurface reservoir formation due to elastic nonlinearity of the reservoir rocks;

(d) selecting a time or depth window in the seismic reflection data volume to cover the zone of investigation for locating the reservoir rocks embedded in the sealing formations;

(e) analyzing the spectral characteristics of the subsurface seismic reflection data in the selected time or depth window to monitor the frequency spectral broadening due to porosity and permeability of the reservoir rocks;

(f) spectral differencing used to identify spectral broadening effects of the individual CDP locations, individual spectral differences measured against the average summed spectra calculated over the selected time or depth window for a larger seismic reflection data volume under investigation;

(g) designing Low-Pass and High-Pass filters based on the spectral differencing results, the filters designed to allow the new higher and lower frequencies created due to nonlinearity of the reservoir rocks and attenuating the frequencies generated by the input source pulse;

(h) applying these Low-Pass and High-Pass filters to the seismic reflection 2-D or 3-D seismic data volume, and displaying the filtered data, which contains only the new frequencies created in the seismic reflection data due to reservoir rock nonlinearity;

(i) interpreting the filtered displays of the seismic reflection data volume to identify the presence of the reservoir rocks embedded in the sealing formations, interpretation based on the presence of the lower and higher frequencies created due to reservoir nonlinearity which were not present in the seismic source input pulse;

(j) mapping the extent and location of the reservoir rocks using the filtered data integrated with the conventional unfiltered data.

Claim 2 (currently amended): A new method of locating and confirming the presence of the porous and permeable reservoir rocks embedded in the sealing formations by using the low-pass frequency filtered seismic reflection data, by identifying the changes that are caused in the amplitude and phase of the reflection data by the presence of the Slow-Wave, which exists in the porous and permeable reservoir formation, and calculating the Slow-Wave velocity and the tortuosity of the reservoir rock, then deriving the reservoir rock's permeability, such method comprising (a) through (f):

(a) analyzing the relative amplitudes, locations and the extent of the reflections in the 2-D or 3-D seismic reflection data

volume, which has been low-pass frequency filtered ~~as described in claim 1~~;

(b) identifying the seismic reflection, which represents the reservoir formation and locating any anomalous artifact, which is related to that particular reflection, appearing as a time-delayed event;

(c) based on the measured time delay between the artifact and the reflection that caused it, calculate the velocity of the Slow-Wave;

(d) perform velocity analysis using CDP reflection data to confirm and refine the Slow-Wave velocity derived earlier;

(e) based on the Slow-Wave velocity and the velocity of the pore fluids derived from wellbore information, calculate the reservoir rock's tortuosity;

(f) estimate the reservoir rock permeability based on the calculated tortuosity and the borehole information providing porosity, grain size and pore structure.